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Hatch et al.

(54) MICROFLUIDIC DEVICES AND METHODS INCLUDING POROUS POLYMER MONOLITHS

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(56) References Cited

U.S. PATENT DOCUMENTS

5,866,047 A	A 2/1999	Nagino et al.	
6,782,746 E	31 8/2004	Hasselbrink, Jr. et al	
6,846,399 E	32 1/2005	Shepodd et al.	
	(Con	(Continued)	

OTHER PUBLICATIONS

Cong Yu; Frantisek Svec; Jean M.J. Frechet; "Towards stationary phases for chomatography on a microchip: Molded porous polymer monoliths prepared in capillaries by photoinitiated in situ polymerization as separation media for electrochromatography", Electrophoresis 2000, 21, pp. 120-127.

(Continued)

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(57) ABSTRACT

Microfluidic devices and methods including porous polymer monoliths are described. Polymerization techniques may be used to generate porous polymer monoliths having pores defined by a liquid component of a fluid mixture. The fluid mixture may contain iniferters and the resulting porous polymer monolith may include surfaces terminated with iniferter species. Capture molecules may then be grafted to the monolith pores.

20 Claims, 9 Drawing Sheets

